Injection Practices on U.S. Dairy Operations, 2007

Injections are administered to dairy cows for a variety of reasons, including preventive measures such as vaccines, antibiotic treatment for disease, manipulation of the reproductive cycle, and production enhancement. Injections must be administered properly, however, to ensure efficacy of the injected product and to minimize lesions, or scar tissue, resulting from the injections.

About 10 years ago, national Beef Quality Assurance (BQA) program guidelines were developed to ensure proper, consistent production practices and quality beef products.[1] Among the BQA guidelines are the following recommendations for use of injectable animal health products:

- Products labeled for subcutaneous (SQ) administration should be administered SQ in the neck region (ahead of the shoulders).
- All products labeled for intramuscular (IM) use shall be given in the neck region only (no exceptions, regardless of age).
- All products cause tissue damage when injected IM. Therefore all IM use should be avoided if possible.
- Products cleared for SQ, intravenous (IV), or oral administration are recommended.
- Products with low dosage rates are recommended and proper spacing should be followed.
- No more than 10 cc of product shall be administered per IM injection site.

Although injection-site lesions are not a food-safety issue, the scar tissue affects meat quality. In the 1990s, the National Cattlemen's Association (now the National Cattlemen's Beef Association, or NCBA) began conducting beef quality audits, with one goal being to evaluate the incidence of injection-site lesions. Dairy cattle represent about 20 percent of all beef consumed in the United States,[2] and they have been included in three quality audits: the National Non-Fed Beef Quality Audit (1994),[2] the 1999 National Market Cow and Bull Quality Audit,[3] and the 2007 National Market Cow and Bull Beef Quality Audit.[4]

Injection-site lesions in the muscle cuts of the upper hip (sirloins and rounds) have decreased substantially since the first audits were conducted. In 2007, 11 percent of dairy cows had injection-site lesions,[4] compared with 49 percent from 1998-2000.[5] The 1999 audit estimated a loss of $1.46 per head due to trim loss associated with injection-site lesions.[3]

This information sheet provides baseline information about injection practices on U.S. dairy operations collected during the National Animal Health Monitoring System (NAHMS) Dairy 2007 study. NAHMS conducted the study of health and management practices in 17 of the Nation's major dairy States,* which represented 79.5 percent of U.S. dairy operations and 82.5 percent of U.S. dairy cows. The operations were divided into 3 herd-size categories based on the number of milk cows present: small (fewer than 100 cows), medium (100 to 499 cows), and large (500 or more cows).

Number of Injections

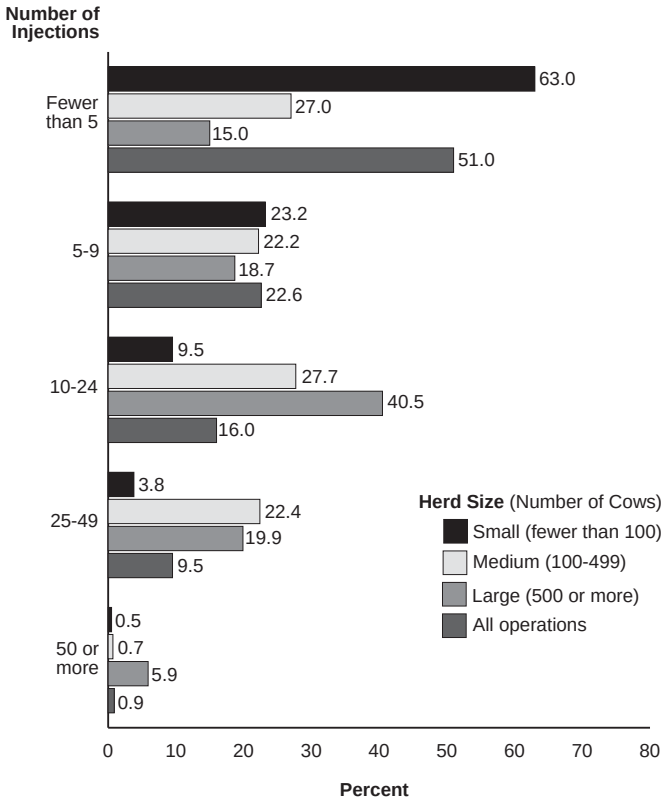
Producers were asked to report the number of injections of any kind a dairy cow typically received during the 12 months prior to the questionnaire interview. For all operations, the operation average number of injections that a cow typically received was 13.8, or slightly more than 1 injection per month. The operation average number of injections per cow increased as herd size increased, with cows on small operations receiving 6.4 injections and cows on large operations receiving 17.3 injections per year.

On about one-half of the operations (51.0 percent), cows received fewer than five injections in the previous 12 months (figure 1). The majority of small operations (63.0 percent) gave fewer than five injections, compared with 27.0 percent of medium operations and 15.0 percent of large operations. About two-fifths of large operations (40.5 percent) typically gave 10 to

*States/Regions:
- **West:** California, Idaho, New Mexico, Texas, and Washington
- **East:** Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, New York, Ohio, Pennsylvania, Vermont, Virginia, and Wisconsin

24 injections per cow during the previous 12 months, compared with 9.5 percent of small operations. The average number of injections typically received by cows for each operation was applied to every cow on that operation to calculate the number of injections by route, location, and purpose of administration.

Figure 1. Percentage of Operations by Number of Injections a Dairy Cow Typically Received During the Previous 12 Months, and by Herd Size



Injection Route

The three primary injection routes are IM, SQ, and IV. Almost all operations (97.4 percent) administered IM injections during the previous 12 months. SQ and IV injections were administered on 69.1 and 70.3 percent of operations, respectively. About two-thirds of all injections were administered IM (68.7 percent), compared with 23.9 percent administered SQ and 7.4 percent IV (table 1). There were no differences in injection route by herd size.

Table 1. Operation Average Percentage of Injections by Route, and by Herd Size:

	Operation Average Percent Injections			
	Herd Size (Number of Cows)			
	Small (Fewer than 100)	Medium (100-499)	Large (500 or More)	All Operations
Route	Pct.	Pct.	Pct.	Pct.
Intramuscular	71.1	63.7	61.5	68.7
Subcutaneous	20.9	30.3	32.6	23.9
Intravenous	8.0	6.0	5.9	7.4
Total	100.0	100.0	100.0	100.0

Injection Location

Scar tissue, which forms after IM injections, causes muscle tissue to be tough, producing a product that may be unacceptable to consumers. Because muscle cuts of the upper hip (sirloins and rounds) are frequently marketed as whole cuts, injection-site lesions may not be noticed prior to retail sale.[3] Producers are advised to follow BQA guidelines and give products labeled for IM injection in front of the shoulder—not in the hip or hind leg. The hip and hind legs likely are common injection locations because they are easier to access than the animal's neck on many dairy facilities.

The primary locations for IM injections were hind leg (45.3 percent of injections) and neck (34.2 percent of injections) [table 2].

Table 2. Percentage of IM Injections by Location, and by Herd Size:

	Percent IM Injections			
	Herd Size (Number of Cows)			
	Small (Fewer than 100)	Medium (100-499)	Large (500 or More)	All Operations
Location	Pct.	Pct.	Pct.	Pct.
Neck	11.8	16.5	50.9	34.2
Shoulder	3.3	3.0	1.3	2.1
Upper hip	16.3	17.4	8.3	12.4
Hind leg	65.5	50.2	37.1	45.3
Other	3.1	12.9	2.4	6.0
Total	100.0	100.0	100.0	100.0

A higher percentage of IM injections were administered in the neck (50.9 percent) on large operations compared with small or medium operations (11.8 and 16.5 percent, respectively). Conversely, a lower percentage of IM injections were administered in the hind leg (37.1 percent) on large operations than small operations (65.5 percent).

Purpose of IM Injections

Of IM injections administered on operations, more than two-fifths (41.3 percent) were vaccinations (table 3). Reproductive and antibiotic injections each accounted for about one-fourth of IM injections (27.3 and 23.1 percent, respectively).

Table 3. For Operations that Administered IM Injections, Operation Average Percentage of IM Injections Administered for the Following Purposes, and by Herd Size:

	Operation Average Percent IM Injections			
	Herd Size (Number of Cows)			
	Small (Fewer than 100)	Medium (100-499)	Large (500 or More)	All Operations
Purpose	Pct.	Pct.	Pct.	Pct.
Antibiotic	24.7	18.9	22.3	23.1
Production enhancement	3.1	8.9	5.6	4.7
Reproduction	25.5	31.9	28.0	27.3
Vaccination	42.9	36.5	43.8	41.3
Other	3.8	3.8	0.3	3.6
Total	100.0	100.0	100.0	100.0

With the exception of production enhancement injections, the percentage of IM injections for a particular purpose was similar across injection locations (table 4). More than 4 of 10 production enhancement injections (41.4 percent) were given in “Other” locations. The most common production enhancement injection, bST (Posilac), is recommended to be given subcutaneously around the tailhead.

Table 4. Percentage of IM Injections by Location and by Purpose of Injection:

	Percent IM Injections				
	Purpose				
	Antibiotic	Production Enhancement	Reproduction	Vaccination	Other
Location	Pct.	Pct.	Pct.	Pct.	Pct.
Neck	41.6	20.5	28.3	47.5	5.3
Shoulder	2.9	8.7	1.6	1.4	0.3
Upper hip	14.5	8.6	11.7	12.5	19.7
Hind leg	39.9	20.8	58.1	37.6	73.3
Other	1.1	41.4	0.3	1.0	1.4
Total	100.0	100.0	100.0	100.0	100.0

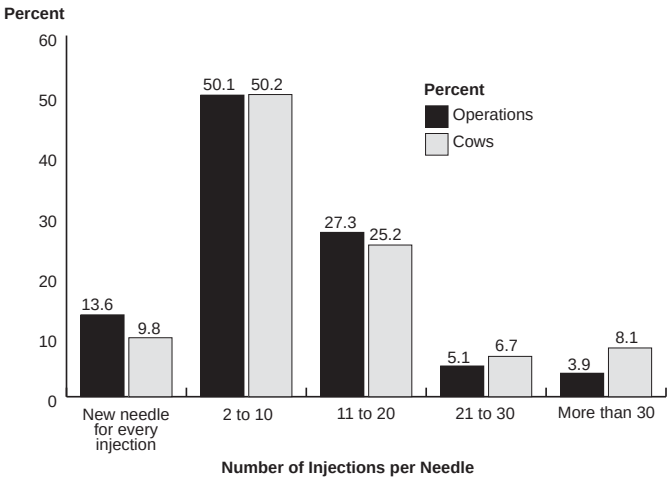
Injection Administration and Needle Use

Almost 9 of 10 injections (89.1 percent) given to dairy cows were administered by farm personnel, with no differences by herd size. Because cattle producers and other farm personnel often administer the injections to cattle on their operation, educating farm personnel about the proper injection practices is essential to ensure product efficacy and to minimize injection-site lesions.

Using a new needle for each cow can decrease disease transmission and also reduce potential injury to the cow by minimizing the possibility of broken needles. About one of seven operations (13.6 percent) used a new needle for every injection during the previous 12 months; these operations represented 9.8 percent of all cows. The majority of operations (50.1 percent), representing 50.2 percent of cows, used each needle to give 2 to 10 injections (figure 2).

About one-fourth of operations (27.3 percent), which represented 25.2 percent of cows, used each needle to give 11 to 20 injections. Although less than 4 percent of operations used needles for more than 30 injections, these operations represented 8.1 percent of cows, suggesting that this practice is more common on larger operations.

Figure 2. Percentage of Operations and Percentage of Cows* on Those Operations, by Number of Injections Given Before Changing Needles



*As a percentage of cows on the operation at time of interview (spring 2007).

Record Keeping

Keeping a record of each treatment a cow receives can help producers ensure that the appropriate therapy and withdrawal times are followed. Overall, about three-fifths of operations (58.2 percent) reported keeping a written or computerized record for each cow that received a treatment requiring a withdrawal time (table 5). A higher percentage of large operations (94.4 percent) than small operations (51.7 percent) and medium operations (67.4 percent) reported keeping a written or computerized record of each treatment.

Table 5. Percentage of Operations That Kept a Written or Computerized Record for Each Cow That Received a Treatment Requiring a Withdrawal Time Before the Cow Could be Sent to Market, and by Herd Size:

Percent Operations			
Herd Size (Number of Cows)			
Small (Fewer than 100)	**Medium** (100-499)	**Large** (500 or More)	**All Operations**
Pct.	**Pct.**	**Pct.**	**Pct.**
51.7	67.4	94.4	58.2

Conclusion

Production of high-quality meat creates economic benefits for the producer and improves the food quality for the consumer. For reasons including lack of awareness, facility design, and ease of administration, many dairy operations still administer IM injections in the hind leg and hip. Continued efforts to educate producers and personnel about the BQA guidelines and to increase compliance should improve meat quality by ensuring that all SQ and IM injections are given in the neck region.

References

1. Beef Quality Assurance Website. Accessed September 2008. http://www.bqa.org/
2. Executive Summary of the National Non-Fed Beef Quality Audit. December 1994. National Cattlemen's Association. Englewood, CO.
3. Executive Summary of the 1999 National Market Cow and Bull Quality Audit. December 1999. National Cattlemen's Beef Association. Englewood, CO.
4. Executive Summary of the 2007 National Market Cow and Bull Beef Quality Audit, Dairy Cattle Edition. National Cattlemen's Beef Association. Centennial, CO.
5. Roeber DL, Cannell RC, Wailes WR, Belk KE, Scanga JA, Sofos JN, Cowman GL, Smith GC. 2002. Frequencies of injection-site lesions in muscles from rounds of dairy and beef cow carcasses. *J Dairy Sci* 85:532-536.

For more information, contact:

USDA:APHIS:VS:CEAH
NRRC Building B, M.S. 2E7
2150 Centre Avenue
Fort Collins, CO 80526-8117
970.494.7000
E-mail: NAHMS@aphis.usda.gov
http://nahms.aphis.usda.gov

#548.0209